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09/756,019	01/05/2001	Evelyn Duesterwald	10990961-1	3721

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EXAMINER	
ROCHE, TRENTON J	
ART UNIT	**PAPER NUMBER**
2124	7

DATE MAILED: 06/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/756,019	DUESTERWALD ET AL.	
	Examiner	Art Unit	
	Trent J Roche	2124	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 March 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *05 January 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. This office action is responsive to Amendment A filed 17 March 2004.

2. Per applicant's request, amended claims 2, 19, 20 and 21 have been entered. New claim 22 has been added. Claims 1-22 are now pending.

3. Claims 1-22 have been examined.

Claim Rejections - 35 USC § 112

4. In light of the applicant's amendments, the rejections of claims 2, 20 and 21 under 35 U.S.C. § 112 2nd paragraph have been withdrawn.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

6. Claims 1-3, 5-8, 20 and 21 are rejected under 35 U.S.C. 102(a) as being anticipated by U.S. Patent 5,937,191 to Graham.

Regarding claim 1:

Graham teaches:

- a method for growing a hot trace in a program during the program's execution ("rearranging the instruction stream of basic blocks in hot traces will improve program execution..." in col. 5 lines 30-31.)

- in a dynamic translator ("translators such as compilers..." in col. 3 line 10)
- identifying an initial block ("a basic block begins with a label..." in col. 3 lines 25-26. Further, the blocks are executed as part of a sequence, as shown in col. 4 lines 35-44. The system inherently identifies an initial block.)
- growing the trace block-by-block by applying static branch prediction rules until an end-of-trace condition is reached ("rearranging the instruction stream of basic blocks in hot traces will improve program execution..." in col. 5 lines 30-31. For a trace to be performed, an end-of-trace condition would inherently be identified so that the trace eventually ends. Further, branch prediction is used in the arrangement, as seen in col. 6 lines 41-44, "the basic blocks of the program can be arranged so that the most frequent path taken at a conditional branch falls through to the next sequential basic block...")

as claimed.

Regarding claim 2:

Graham teaches:

- a method for growing a hot trace in a program during the program's execution ("rearranging the instruction stream of basic blocks in hot traces will improve program execution..." in col. 5 lines 30-31.)
- in a dynamic translator ("translators such as compilers..." in col. 3 line 10)
- identifying an initial block as the first block in a trace to be selected ("a basic block begins with a label..." in col. 3 lines 25-26 Further, the blocks are executed as part of a sequence, as shown in col. 4 lines 35-44. The system inherently identifies an initial block.)

- until an end-of-trace condition is reached, applying static branch prediction rules to a terminating branch of a last block in the trace to identify a next block to be added ("rearranging the instruction stream of basic blocks in hot traces will improve program execution..." in col. 5 lines 30-31. For a trace to be performed, an end-of-trace condition would inherently be identified so that the trace eventually ends. Further, branch prediction is used in the arrangement, as seen in col. 6 lines 41-44, "the basic blocks of the program can be arranged so that the most frequent path taken at a conditional branch falls through to the next sequential basic block...")
- adding the identified next block to the selected trace ("placing the source and destination blocks together." in col. 6 lines 48-49)

as claimed.

Regarding claim 3:

The rejection of claim 2 is incorporated, and further, Graham teaches storing the selected traces in a code cache ("reorganizing data structures of the program to reduce the data cache usage of the program in response to said program activity..." in col. 7 lines 21-23.)

Regarding claim 5:

The rejection of claim 2 is incorporated, and further, Graham teaches predicting the outcomes and targets of branches as claimed (Note col. 6 lines 41-49)

Regarding claim 6:

The rejection of claim 2 is incorporated, and further, Graham teaches maintaining execution counts for targets of branches as claimed ("by counting block arc transitions more accurate block execution count information can be obtained." in col. 4 lines 42-44)

Regarding claim 7:

The rejection of claim 2 is incorporated, and further, Graham teaches determining whether to add a target instruction to the hot trace as claimed ("so that the most frequent path taken at a conditional branch falls through to the next sequential basic block as opposed to jumping to a non-sequential successor block." in col. 6 lines 41-45)

Regarding claim 8:

The rejection of claim 7 is incorporated, and further, Graham teaches determining if the branch instruction is unconditional, and adding the target instruction of the branch instruction and the following instructions through the next branch to the hot trace as claimed ("unconditional branches from a source basic block to a destination basic block...can be removed by...placing the source and destination basic blocks together." in col. 6 lines 45-49)

Regarding claims 20 and 21:

Claims 20 and 21 are directed to a dynamic translator and a computer program product for performing the method of claim 2, and are rejected for the reasons set forth in connection with claim 2.

Regarding claim 22:

Graham teaches:

- a dynamic translator ("translators such as compilers..." in col. 3 line 10. The aspect of a dynamic translator is considered to be a limitation stating intended use of the apparatus, and is therefore not given patentable weight, as a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. Ex parte Masham, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987). Note MPEP 2114. The translator of Graham discloses all of the structural limitations of claim 22.)
- growing a hot trace in a program during the program's execution in the dynamic translator ("rearranging the instruction stream of basic blocks in hot traces will improve program execution..." in col. 5 lines 30-31. Further, the system inherently identifies an initial hot trace so that the blocks may be rearranged.)
- identifying an initial block ("a basic block begins with a label..." in col. 3 lines 25-26. Further, the blocks are executed as part of a sequence, as shown in col. 4 lines 35-44. The system inherently identifies an initial block.)
- starting with the initial block, growing the trace block-by-block by applying static branch prediction rules until an end-of-trace condition is reached ("rearranging the instruction stream of basic blocks in hot traces will improve program execution..." in col. 5 lines 30-31. For a trace to be performed, an end-of-trace condition would inherently be identified so that the trace eventually ends. Further, branch prediction is used in the arrangement, as seen in col. 6 lines 41-44, "the basic blocks of the program can be arranged so that the most frequent path taken at a conditional branch falls through to the next sequential basic block...")

as claimed.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,937,191 to Graham in view of U.S. Patent 6,463,582 to Lethin et al.

Regarding claim 4:

The rejection of claim 2 is incorporated, and further, Graham does not teach end-of-trace conditions as claimed. Lethin et al teach in an analogous translation system the use of threshold conditions for determining what should be executed ("A variable threshold called the block picking threshold is used to select frequently executed blocks. If the execution probability of a block is larger than or equal to the threshold, then that block is considered frequently executed and it is translated. If the execution probability is below the threshold, then the block is considered infrequently executed and is not translated." in col. 59 lines 42-48). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the threshold conditions of Lethin et al with the optimization methods of Graham, enabled via the addition of instructional code, as this would improve the likelihood of a higher probability of success of a branch prediction being accurate in the system disclosed by Graham.

9. Claims 9-12 and 16-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,937,191 to Graham in view of U.S. Patent 5,687,360 to Chang.

Regarding claim 9:

The rejection of claim 7 is incorporated, and further, Graham does not teach symbolically evaluating a branch condition as claimed. Chang teaches in an analogous system utilizing branch prediction a method of symbolically evaluating a branch condition ("Another static scheme predicts that certain types of branches (for example, jump-on-zero instructions) will always be Taken or Not Taken." in col. 2 lines 6-8). It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the branch prediction method of Chang with the program optimization methods of Graham, enabled via the addition of instructional code, as this would further improve branch prediction accuracy, further improving optimizations in the system of Graham.

Regarding claim 10:

The rejection of claim 7 is incorporated, and further, Graham does not teach determining if a heuristic rule can be applied to a branch instruction as claimed. Chang teaches in an analogous system utilizing branch prediction heuristics the use of rules in predictions ("Another static scheme predicts that certain types of branches (for example, jump-on-zero instructions) will always be Taken or Not Taken." in col. 2 lines 6-8). It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the heuristic rule prediction method of Chang with the

program optimization methods of Graham, enabled via the addition of instructional code, as this would further improve branch prediction accuracy, further improving optimizations in the system of Graham.

Regarding claim 11:

The rejection of claim 9 is incorporated, and further, Graham does not teach determining if a heuristic rule can be applied to a branch instruction as claimed. Chang teaches in an analogous system utilizing branch prediction heuristics the use of rules in predictions ("Another static scheme predicts that certain types of branches (for example, jump-on-zero instructions) will always be Taken or Not Taken." in col. 2 lines 6-8). It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the heuristic rule prediction method of Chang with the program optimization methods of Graham, enabled via the addition of instructional code, as this would further improve branch prediction accuracy, further improving optimizations in the system of Graham.

Regarding claim 12:

The rejection of claim 10 is incorporated, and further, Graham does not teach determining whether a confidence counter has reached a threshold level as claimed. Chang teaches an analogous system utilizing branch prediction the use of a counter which has a threshold level ("if the count is greater than or equal to a predetermined threshold value..." in col.3 lines 47-48.) It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the threshold-based counter of Chang with the program optimization methods of Graham, enabled via the

addition of instructional code, as this would allow a user to specify the maximum number of times to take a certain branch in the system of Graham.

Regarding claim 16:

The rejection of claim 2 is incorporated, and further, Graham does not teach incrementing or decrementing based on which static branch prediction rule has been applied as claimed. Chang teaches an analogous system utilizing branch prediction a counter which increments or decrements based on prediction rules ("If the branch is Taken, the count for the branch sequence is incremented by one...otherwise the count is decremented by one." in col. 3 lines 53-56). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the counter of Chang with the program optimization methods of Graham, enabled via the addition of instructional code, as this would enable a user to accurately determine the total number of Taken branches to Not Taken branches, for use in further optimizing the system of Graham.

Regarding claim 17:

The rejection of claim 2 is incorporated, and further, Graham does not teach associating a different count with each different target instruction as claimed. Chang teaches an analogous system utilizing branch prediction a counter associated with teach branch instruction which increments or decrements based on prediction rules ("Because each branch instruction has its own array of counters..." in col. 3 lines 66-67. Further, "If the branch is Taken, the count for the branch sequence is incremented by one...otherwise the count is decremented by one." in col. 3 lines 53-56). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the multiple counters of Chang with the program optimization methods of Graham, enabled via

the addition of instructional code, as this would enable a user to accurately determine specific instructions which require more optimization than others in the system of Graham.

Regarding claim 18:

The rejection of claim 17 is incorporated, and further, Graham does not teach the target instructions including backwards taken branches and exit branches as claimed. Chang teaches an analogous system utilizing branch prediction rules based on the direction of the branch ("Static schemes may also be based upon the direction of the branch, as in 'if the branch is backward, predict Taken, if forward, predict Not Taken.'" in col. 2 lines 9-11). It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the branch prediction method of Chang with the program optimization methods of Graham, enabled via the addition of instructional code, as this would further improve branch prediction accuracy, further improving optimizations in the system of Graham.

Regarding claim 19:

The rejection of claim 2 is incorporated, and further, Graham does not teach wherein a total number of instructions exceeds a predetermined limit as claimed. Chang teaches an analogous system utilizing branch prediction the use of a counter which has a threshold level ("if the count is greater than or equal to a predetermined threshold value..." in col.3 lines 47-48.) It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the threshold-based counter of Chang with the program optimization methods of Graham, enabled via the addition of instructional code, as this would allow a user to specify the maximum number of times to take a certain branch in the system of Graham.

10. Claims 13 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,937,191 to Graham in view of U.S. Patent 6,282,629 to Sager.

Regarding claim 13:

The rejection of claim 7 is incorporated, and further, Graham does not teach determining whether a branch instruction is a procedure return, and determining if a value in a link register has been modified as claimed. Sager teaches in an analogous branch prediction system the determination of whether an instruction is a procedure return and the use of a register ("When branch type 'Procedure Return' is coded, instead of using a fixed A address from the prediction store, we used the predicted return address from the stack..." in col. 19 lines 29-31). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the procedure return checking code of Sager with the program optimization methods of Graham, enabled via the addition of instructional code, as this would improve performance of the system disclosed by Graham by ensuring that values contained in any one of the registers which may be used by the set of instructions will not have changed before the trapped condition is recognized, as discussed in the background of Sager.

Regarding claim 15:

The rejection of claim 13 is incorporated, and further, note the rejection regarding claim 13.

11. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,937,191 to Graham in view of U.S. Patent 5,687,360 to Chang, further in view of U.S. Patent 6,282,629 to Sager.

Regarding claim 14:

The rejection of claim 11 is incorporated, and further, neither Graham nor Chang teach determining whether a branch instruction is a procedure return, and determining if a value in a link register has been modified as claimed. Sager teaches in an analogous branch prediction system the determination of whether an instruction is a procedure return and the use of a register ("When branch type 'Procedure Return' is coded, instead of using a fixed A address from the prediction store, we used the predicted return address from the stack..." in col. 19 lines 29-31). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the procedure return checking code of Sager with the program optimization methods of Graham, modified by Chang. This modification would be enabled by adding instructional code to the system of Graham, modified by Chang. One of ordinary skill in the art would be motivated to do this as this would improve performance of the system disclosed by Graham, modified by Chang, by ensuring that values contained in any one of the registers which may be used by the set of instructions will not have changed before the trapped condition is recognized, as discussed in the background of Sager.

Response to Arguments

12. Applicant's arguments filed 17 March 2004 have been fully considered but they are not persuasive.

Per claim 1:

The applicant states that Graham does not disclose or suggest a trace being grown during the programs execution. In response, it is noted that Graham discloses that an executable program is made up of blocks that are executed one after another. Furthermore, it is indicated, as shown in the prior office action, that a heavily executed sequence of basic blocks is considered a 'hot trace.' On page 8 of the applicant's remarks, the applicant concedes that the disclosure of Graham indicates that a record of heavily executed traces, i.e. 'hot traces,' are "retrieved" by the post processor after the fact. Consequently, the system of Graham must inherently grow a hot trace, as the trace information would not exist and would therefore not be capable of being retrieved by the post-processor. Alternatively, Graham suggests in col. 5 lines 24-26, that the information regarding the heavily executed traces may be retrieved during execution of the program. This further reinforces the notion that the hot trace is indeed grown during execution of the program.

The applicant further argues that Graham does not disclose a dynamic translator. In response to applicant's arguments, the recitation of a dynamic translator has not been given patentable weight because the recitation occurs in the preamble. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951).

The applicant further argues that Graham does not disclose a step of identifying an initial block. As was noted in the prior office action and above, Graham was shown to identify traces of basic blocks

in the execution of a program. Consequently, an initial block in the program must inherently be identified, as the program must start at some block. The citation of col. 3 lines 25-26 was intended to indicate that the system has a way to indicate the beginning of a block, which is clearly retrieved from one initial block so that the execution of the program may progress.

Finally, it would appear that the applicant argues that Graham does not disclose the claimed branch prediction feature as described in claim 1, however, a portion of the Graham reference was cited and it is not clear what arguments the applicant intended to communicate. Therefore, the argument that Graham does not disclose the claimed branch prediction feature of claim 1 is considered a mere allegation of patentability and that the applicant's arguments fail to comply with 37 CFR 1.111(b) because they amount to a general allegation that the claim defines a patentable invention without specifically pointing out how the language of the claim patentably distinguishes it from the reference.

For these reasons, the rejection of claim 1 is considered proper and maintained.

Per claim 2:

The applicant states that the rejection of claim 2 is traversed for the reasons pertaining to claim 1 above. As was shown above, the rejection of claim 1 is considered proper and maintained. Further, the applicant states that the recitation of branch prediction does not suggest static branch prediction rules and that there is no disclosure of static branch prediction rules in Graham. In response, it is noted that the branch prediction of Graham is based on code that is compiled and then executed. Furthermore, the branch logic is used to direct execution of the program across blocks, as shown in col. 4 lines 37-42. The logic behind the branching of Graham is therefore hard-coded into the

system and branch prediction is therefore based on static rules built into the source code. As such, according to the broadest reasonable interpretation of the claims, the branch predictions of Graham do indeed constitute static branch prediction rules, as the rules are static in the program and are not capable of dynamically changing during execution.

The applicant further argues that Graham does not disclose the aspect of a dynamic translator, however, as with claim 1, the recitation of a dynamic translator has not been given patentable weight because the recitation occurs in the preamble. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951).

The applicant further appears to argue that "placing source and destination blocks together is fundamentally different from adding another block to a sequence of selected blocks," and that the claimed subject matter clearly indicates that there is at very lease one block between the source and destination blocks. In response, it is noted that there is no indication in the claim language of any order of blocks as recited in claim 2, merely that an initial block is identified as a first block, and identifying a next block to add to the trace, further adding the next block to the trace. As was shown in the rejection of claim 1 above, Graham has been shown to suggest this aspect of the claim. Therefore, the statement that Graham does not provide a *prima facie* case of anticipation of this aspect is considered moot.

For these reasons, the rejection of claim 2 is considered proper and maintained.

Per claim 3:

The applicant argues that Graham does not disclose storing the traces in a code cache. In response, it is noted that the reorganization of the basic block structure of the program is intended to reduce the cache usage of the program. Indeed, in col. 5 lines 35-37, this purpose is stated. Therefore, it must clearly follow that the trace information from the prior execution of the program was stored in the cache, as the intended purpose of the block re-arrangement of the system of Graham is to reduce the amount of cache required for this information. For this reason, the rejection of claim 3 is considered proper and maintained.

Per claim 5:

The applicant argues that Graham does not disclose the use of different rules in the manner specified in claim 5. However, no argument is presented on how the cited portion does not disclose the claimed features, and as such, the applicant's arguments are considered mere allegations and fail to comply with 37 CFR 1.111(b) because they amount to a general allegation that the claim defines a patentable invention without specifically pointing out how the language of the claim patentably distinguishes it from the reference. For this reason, the rejection of claim 5 is considered proper and maintained.

Per claim 6:

The applicant argues that the cited portion of Graham does not disclose or suggest the features of claim 6. However, as noted in the prior office action, the Examiner did not cite col. 6 lines 42-44,

but rather col. 4 lines 42-44, and as such, the arguments that col. 6 lines 42-44 does not disclose or suggest the features of claim 6 are considered moot. For this reason, the rejection of claim 6 is considered proper and maintained.

Per claim 7:

The applicant states that it is not clear how the cited portion of Graham is intended to disclose adding a target instruction to a hot trace based on a set of static branch prediction rules. As was stated above, static branch prediction rules are utilized to move from block to block during execution of the program. The cited portion was utilized to indicate that a hot trace previously grown during the execution of the program can be rearranged so that the amount of branching to the next basic block is minimized. Consequently, the system would have inherently added a target instruction to a hot trace, as the rearrangement is based on recorded hot trace information, and could not occur if instructions were added to the hot trace, as the hot trace would then not exist. The rejection of claim 7 is maintained.

Per claims 20 and 21:

The rejections of claim 20 and 21 are considered proper and maintained on the same basis as stated above.

Per claims 4 and 9-19:

The applicant states that claims 4 and 9-19 are allowable as being based on an allowable base claim. Furthermore, the applicant fails to show that the reasons to combine and motivations concerning the rejections of claim 4 and 9-19 are improper. As shown above, the rejections of at least claims 1-3

and 5-7 are proper, and as such, the argument that claims 4 and 9-19 are allowable as being based on an allowable base claim is considered moot. The rejections of claim 4 and 9-19 are proper and maintained.

Conclusion

13. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Trent J Roche whose telephone number is (703)305-4627. The examiner can normally be reached on Monday - Friday, 9:00 am - 6:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kakali Chaki can be reached on (703)305-9662. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Trent J Roche
Examiner
Art Unit 2124

TJR

Kakali Cha.

KAKALI CHAKI
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100